

This Page Is Inserted by IFW Operations
and is not a part of the Official Record

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

IMAGES ARE BEST AVAILABLE COPY.

**As rescanning documents *will not* correct images,
please do not report the images to the
Image Problems Mailbox.**

WHAT IS CLAIMED IS:

1. A global synchronization unit (GSU) for time and space (TS) stamping of input data elements, said GSU comprising:

a GPS Receiver and an associated antenna for receiving GPS signals from signal sources associated with a GPS system symbolically embedded within a global reference system, and processing said received GPS signals so as to automatically produce time and space (TS) stamp data element representative of the time and space coordinates of said GSU with respect to said global reference system at each data sampling instant occurring within said GSU; and

a central processor, operably connected to said GPS Receiver; and

a data input port, operably connected to a data input device and said central processor, for receiving an input data element from said data input device, at each said data sampling instant;

wherein said central processor (i) connects the input data element received at said data input port at each said data sampling instant, with the TS-stamp data element generated at said sampling instant so as to produce a TS-stamped input data element, and (ii) stores each said TS-stamped input data element in memory.

2. The GSU of claim 1, wherein said memory is disposed within said GSU.

3. The GSU of claim 1, wherein said GPS Receiver receives said GPS signals from GPS satellites, and said GPS satellites receive time signals derived from an atomic clock.

4. The GSU of claim 1, wherein said data input device is a device selected from the group consisting of a mouse, keyboard, microphone, video camera, scanner, barcode reader, pressure tablet, a voice recognition system, biometric sensor, biophysiological sensor, and any other analog or digital data input device.

5. The GSU of claim 1, wherein said data input device is a device selected from the group consisting of water level sensors, burglar alarms, police radar devices, still image cameras, video cameras, microphones, and chemical sensors, bar-code readers, document scanners, fingerprint readers, iris-scanners, vehicle counters, and optical sensors for race finish lines.

6. The GSU of claim 1, which further comprises a data output port for outputting said TS-stamped input data elements stored in said memory to a data output device operably connected to said data output port.

7. The GPU of claim 6, wherein said data output port comprises hardware and communication protocols to enable communication between said central processor and said data output device.

8. The GSU of claim 1, wherein said central processor further (iii) accesses said TS-stamped input data elements from said memory and transmits the accessed TS-stamped input data elements through said data output port to said data output device.

9. The GSU of claim 1, wherein each said input data element being representative of an event occurring outside of said GSU.

10. The GSU of claim 1, wherein said central processor further performs encryption functions on each said input data element contained within said TS-stamped input data element.

11. The GSU of claim 1, wherein said central processor further performs encryption functions on each said TS-stamped input data element.

12. The GSU of claim 11, wherein said central processor further calculates a digital signature for each said TS-stamped input data element and connects said digital signature to said TS-stamped input data element to produce a digitally-signed TS-stamped input data element which enables the verification of authenticity of the data contained in said TS-stamped input data element, at some remote location.

13. The GSU of claim 12, wherein said central processor further performs encryption functions on said digitally-signed TS-stamped input data element.

14. The GSU of claim 1, wherein said data input device is a device selected from the group consisting of a mouse, keyboard, microphone, video camera, scanner, barcode reader, pressure tablet, a voice recognition system, biometric sensor, biophysiological sensor, and any other analog or digital data input device.

20. The GSU of claim 18, wherein said GPS Receiver receives said GPS signals from GPS satellites, and said GPS satellites receive time signals derived from an atomic clock.

21. The GSU of claim 18, wherein said data input device is a device selected from the group consisting of a mouse, keyboard, microphone, video camera, scanner, barcode reader, pressure tablet, a voice recognition system, biometric sensor, biophysiological sensor, and any other analog or digital data input device.

22. The GSU of claim 18, wherein said data input device is a device selected from the group consisting of water level sensors, burglar alarms, police radar devices, still image cameras, video cameras, microphones, and chemical sensors, bar-code readers, document scanners, fingerprint readers, iris-scanners, vehicle counters, and optical sensors for race finish lines.

23. The GSU of claim 18, which further comprises an output data port for outputting said TS-stamped input data elements stored in said non-volatile memory to a data output device operably connected to said data output port.

24. The GSU of claim 23, wherein said central processor further (iii) accesses said TS-stamped input data elements from said non-volatile memory and transmits the accessed TS-stamped input data elements through said data output port to said data output device.

25. The GSU of claim 1, wherein said encrypted input data element is an encrypted image data set to be displayed by said data output device and said function triggering data specifies the TS triggering coordinates at which said central processor is to (i) decrypt said encrypted input image into a decrypted image data set, and (ii) transmit said decrypted image data set through said data output port to said data output device for display, and

upon said GPS receiver producing a TS-stamp data element representative of said TS triggering coordinates, said central processor automatically (i) decrypts said encrypted image data set into said decrypted image data set, and (ii) transmits said decrypted image data set through said data output port to said data output device for display.

26. The GSU of claim 18, wherein said data input port comprises hardware and communication protocols to enable communication between said central processor and said data input device.

27. The GSU of claim 23, wherein said data output port comprises hardware and communication protocols to enable communication between said central processor and said data output device.

28. The GSU of claim 18, wherein said GSU is realized in the form of an integrated circuit (IC) chip.

29. The GSU of claim 18, wherein said IC chip is an Application Specific Integrated Circuit (ASIC) device.

30. A global synchronization unit (GSU) for use with a host computing device, said GSU comprising:

a GPS Receiver and an associated antenna for receiving GPS signals from signal sources associated with a GPS system symbolically embedded within a global reference system, and processing said received GPS signals so as to automatically produce time and space (TS) stamp data element representative of the time and space coordinates of said GSU with respect to said global reference system at each data sampling instant occurring within said GSU; and

a central processor, operably connected to said GPS Receiver, and having a host computer interface for receiving an input data element from said host computing device, at each said data sampling instant, and

wherein said central processor (i) connects the input data element received at said host computer interface at each said sampling instant, with the TS-stamp data element generated at said data sampling instant so as to produce a TS-stamped input data element, and (ii) stores each said TS-stamped input data element in memory.

31. The GSU of claim 30, wherein said memory is disposed within said GSU.

32. The GSU of claim 30, wherein said memory is disposed within said host computing device.

33. The GSU of claim 30, wherein said GPS Receiver receives said GPS signals from GPS satellites, and said GPS satellites receive time signals derived from an atomic clock.

00514500-022000

34. The GSU of claim 30, wherein said central processor further (iii) accesses said TS-stamped input data elements from said memory disposed within said GSU and transmits the accessed TS-stamped input data elements through said host computer interface to said host computing device.

35. The GSU of claim 30, wherein each said input data element being representative of an event occurring outside of said GSU.

36. The GSU of claim 30, wherein said central processor further performs encryption functions on each said input data element contained within said TS-stamped input data element.

37. The GSU of claim 30, wherein said central processor further performs encryption functions on each said TS-stamped input data element.

38. The GSU of claim 30, wherein said central processor further calculates a digital signature for each said TS-stamped input data element and connects said digital signature to said TS-stamped input data element to produce a digitally-signed TS-stamped input data element which enables the verification of authenticity of the data contained in said TS-stamped input data element, at some remote location.

39. The GSU of claim 38, wherein said central processor further performs encryption functions on said digitally-signed TS-stamped input data element.

40. The GSU of claim 30, wherein said host computer interface comprises hardware and communication protocols to enable communication between said central processor and said host computing device.

41. The GSU of claim 30, wherein said host computer interface conforms to standard interface specifications selected from the group consisting of bus-based connections such as ISA, SCSI, and PCI; port-based connections such as USB, RS232, and PCMCIA; and wireless communication methods such as infrared and radio frequency links.

42. The GSU of claim 30, wherein said host computing device further comprises a network communications interface to an information network.

43. The GSU of claim 42, wherein the network communications interface is realized a wireless communication method.

44. The GSU of claim 30, wherein said GSU is realized in the form of an integrated circuit (IC) chip.

45. The GSU of claim 44, wherein said IC chip is an Application Specific Integrated Circuit (ASIC) device.

46. The GSU of claim 30, wherein said GSU and said host computing device are realized in the form of an Application Specific Integrated Circuit (ASIC) device.

47. A GSU-enable client computing device comprising said GSU and said client computing device of claim 30.

48. The GSU-enabled client computing device of claim 30, wherein said client computing device has a data input device for producing said input data elements, and wherein said data input device is selected from the group consisting of a mouse, keyboard, microphone, video camera, scanner, barcode reader, pressure tablet, a voice recognition system, biometric sensor, biophysiological sensor, and any other analog or digital data input device.

49. The GSU-enabled client computing device of claim 30, wherein said client computing device has a data input device for producing said input data elements, and wherein said data input device is selected from the group consisting of water level sensors, burglar alarms, police radar devices, still image cameras, video cameras, microphones, and chemical sensors, bar-code readers, document scanners, fingerprint readers, iris-scanners, vehicle counters, and optical sensors for race finish lines.

50. A global synchronization unit (GSU) for use with a host computing device
said GSU comprising:

a GPS Receiver and an associated antenna for receiving GPS signals from signal sources associated with a GPS system symbolically embedded within a global reference system, and processing said received GPS signals so as to automatically produce time and space (TS) stamp data element representative of the time and space coordinates of said GSU within said global reference system at each data sampling instant occurring within said GSU; and

a central processor, operably connected to said GPS Receiver, and having a host computer interface for receiving, through said host computer interface, an encrypted input data element and function triggering data from said host computing device, and storing said encrypted input data element and said function triggering data in non-volatile memory,

wherein said function triggering data specifies the TS triggering coordinates at which said central processor is to (i) decrypt said encrypted data element into a decrypted input data element, and (ii) perform a predetermined function upon said decrypted input data element, and

upon said GPS receiver producing a TS-stamp data element representative of said TS triggering coordinates, said central processor automatically (i) decrypts said encrypted data element into a decrypted input data element, and (ii) performs said predetermined function upon said decrypted input data element.

51. The GSU of claim 50, wherein said non-volatile memory is disposed within said GSU.

52. The GSU of claim 50, wherein said GPS Receiver receives said GPS signals from GPS satellites, and said GPS satellites receive time signals derived from an atomic clock.

53. The GSU of claim 50, wherein said encrypted input data element is an encrypted image data set to be displayed by said client computing device and said function triggering data specifies the TS triggering coordinates at which said central processor is to (i) decrypt said encrypted input image into a decrypted image data set, and (ii) transmit said decrypted image data set through said host computer interface to said host computing device for display, and

upon said GPS receiver producing a TS-stamp data element representative of said TS triggering coordinates, said central processor automatically (i) decrypts said encrypted image data set into said decrypted image data set, and (ii) transmits said decrypted image data set through said host computer interface to said host computing device for display.

54. The GSU of claim 50, wherein said host computer interface comprises hardware and communication protocols to enable communication between said central processor and said host computing device.

55. The GSU of claim 50, wherein said host computer interface conforms to standard interface specifications selected from the group consisting of bus-based connections such as ISA, SCSI, and PCI; port-based connections such as USB, RS232, and PCMCIA; and wireless communication methods such as infrared and radio frequency links.

56. The GSU of claim 50, wherein said host computing device further comprises a network communications interface to an information network.

57. The GSU of claim 56, wherein the network communications interface is realized a wireless communication method.

58. The GSU of claim 50, wherein said GSU is realized in the form of an integrated circuit (IC) chip.

59. The GSU of claim 50, wherein said IC chip is an Application Specific Integrated-Circuit (ASIC) device.

60. The GSU of claim 50, wherein said GSU and said host computing device are realized in the form of an Application Specific Integrated Circuit (ASIC) device.

61. A GSU-enable client computing device comprising said GSU and said client computing device of claim 50.

62. The GSU-enabled client computing device of claim 61, wherein said client computing device has a data input device for producing said input data elements, and wherein said data input device is selected from the group consisting of a mouse, keyboard, microphone, video camera, scanner, barcode reader, pressure tablet, a voice recognition system, biometric sensor, biophysiological sensor, and any other analog or digital data input device.

63. The GSU-enabled client computing device of claim 61, wherein said client computing device has a data input device for producing said input data elements, and wherein said data input device is selected from the group consisting of water level sensors, burglar alarms, police radar devices, still image cameras, video cameras, microphones, and chemical sensors, bar-code readers, document scanners, fingerprint readers, iris-scanners, vehicle counters, and optical sensors for race finish lines.

054508.022800

64. A global synchronization unit (GSU) for use with a host computing device having a network interface for connecting to a GPS-enabled information server on an information network, wherein said GPS-enabled information server includes (1) a GPS receiver and associated antenna for receiving GPS signals from signal sources associated with a GPS system symbolically embedded within a global reference system, and processing said received GPS signals so as to automatically produce time and space (TS) stamp data element representative of the time and space coordinates of said GPS-enabled information server with respect to said global reference system at each data sampling instant occurring within said GPS-enabled information server, and (2) a network interface for transmitting data elements to and receiving data elements from said host computing device over said information network, said GSU comprising:

a GPS Receiver and an associated antenna for receiving GPS signals from signal sources associated with a GPS system symbolically embedded within a global reference system, and processing said received GPS signals so as to automatically produce time and space (TS) stamp data element representative of the time and space coordinates of said GSU within said global reference system at each data sampling instant occurring within said GSU; and

a central processor, operably connected to said GPS Receiver, and having a host computer interface for receiving, through said host computing device, at each said data sampling instant, an encrypted input data element and function triggering data from said GPS-enabled information server through said host computing device, and storing said encrypted input data element and said function triggering data in non-volatile memory,

wherein said function triggering data specifies the TS triggering coordinates at which said central processor is to (i) decrypt said encrypted data element into a decrypted input data element, and (ii) perform a predetermined function upon said decrypted input data element, and

upon said GPS receiver producing a TS-stamp data element representative of said TS triggering coordinates, said central processor automatically (i) decrypts said encrypted data element into a decrypted input data element, and (ii) performs said predetermined function upon said decrypted input data element.

65. The GSU of claim 64, wherein said non-volatile memory is disposed within said GSU.

00514598 0022500

66. The GSU of claim 64, wherein said GPS Receiver receives said GPS signals from GPS satellites, and said GPS satellites receive time signals derived from an atomic clock.

5 67. The GSU of claim 64, wherein said encrypted input data element is an encrypted image data set to be displayed by said client computing device and said function triggering data specifies the TS triggering coordinates at which said central processor is to (i) decrypt said encrypted input image into a decrypted image data set, and (ii) transmit said decrypted image data set through said host computer interface to said host computing device for display, and

10 upon said GPS receiver producing a TS-stamp data element representative of said TS triggering coordinates, said central processor automatically (i) decrypts said encrypted image data set into said decrypted image data set, and (ii) transmits said decrypted image data set through said host computer interface to said host computing device for display.

15 68. The GSU of claim 64, wherein said host computer interface comprises hardware and communication protocols to enable communication between said central processor and said host computing device.

20 69. The GSU of claim 64, wherein said host computer interface conforms to standard interface specifications selected from the group consisting of bus-based connections such as ISA, SCSI, and PCI; port-based connections such as USB, RS232, and PCMCIA; and wireless communication methods such as infrared and radio frequency links.

25 70. The GSU of claim 64, wherein said host computing device further comprises a network communications interface to an information network.

30 71. The GSU of claim 70, wherein the network communications interface is realized a wireless communication method.

35 72. The GSU of claim 64, wherein said GSU is realized in the form of an integrated circuit (IC) chip.

73. The GSU of claim 64, wherein said IC chip is an Application Specific Integrated Circuit (ASIC) device.

74. The GSU of claim 64, wherein said GSU and said host computing device are realized in the form of an Application Specific Integrated Circuit (ASIC) device.

75. A GSU-enable client computing device comprising said GSU and said client computing device of claim 64.

76. The GSU-enabled client computing device of claim 75, wherein said client computing device has a data input device for producing said input data elements, and wherein said data input device is selected from the group consisting of a mouse, keyboard, microphone, video camera, scanner, barcode reader, pressure tablet, a voice recognition system, biometric sensor, biophysiological sensor, and any other analog or digital data input device.

77. The GSU-enabled client computing device of claim 75, wherein said client computing device has a data input device for producing said input data elements, and wherein said data input device is selected from the group consisting of water level sensors, burglar alarms, police radar devices, still image cameras, video cameras, microphones, and chemical sensors, bar-code readers, document scanners, fingerprint readers, iris-scanners, vehicle counters, and optical sensors for race finish lines.

78. The GSU of claim 64, wherein said encrypted input data element is an encrypted image data set to be displayed by said client computing device and said function triggering data specifies the TS triggering coordinates at which said central processor is to (i) decrypt said encrypted input image into a decrypted image data set, and (ii) transmit said decrypted image data set through said host computer interface to said host computing device for display, and

upon said GPS receiver producing a TS-stamp data element representative of said TS triggering coordinates, said central processor automatically (i) decrypts said encrypted image data set into said decrypted image data set, and (ii) transmits said decrypted image data set through said host computer interface to said host computing device for display.

79. The GSU of claim 78, wherein said host computer interface further receives at a data sampling instant, an input data element from said host computing device, in response to the performance of said predetermined function upon said decrypted input data element, and,

wherein said central processor (i) connects the input data element received at said host computer interface with the TS-stamp data element

09514500.022000

generated at said data sampling instant so as to produce a TS-stamped input data element, (ii) stores said TS-stamped input data element in memory, and (iii) transmits said TS-stamped input data element through said host computer interface to said GPS-enabled information receiver through said host computing device.

80. The GSU of claim 78, wherein said input data element is representative of a response to the display of said decrypted image data set.

81. The GSU of claim 78, wherein said memory is disposed within said GSU.

82. The GSU of claim 78, wherein said memory is disposed within said host computing device.

83. The GSU of claim 78, wherein said central processor further performs encryption functions on each said input data element contained within said TS-stamped input data element.

84. The GSU of claim 78, wherein said central processor further performs encryption functions on each said TS-stamped input data element.

85. The GSU of claim 78, wherein said central processor further calculates a digital signature for each said TS-stamped input data element and connects said digital signature to said TS-stamped input data element to produce a digitally-signed TS-stamped input data element which enables the verification of authenticity of the data contained in said TS-stamped input data element, at said GPS-enabled information receiver.

86. The GSU of claim 85, wherein said central processor further performs encryption functions on said digitally-signed TS-stamped input data element.

87. The GSU of claim 78, wherein said host computer interface comprises hardware and communication protocols to enable communication between said central processor and said host computing device.

88. The GSU of claim 78, wherein said host computer interface conforms to standard interface specifications selected from the group consisting of bus-based connections such as ISA, SCSI, and PCI; port-based connections such as USB,

RS232, and PCMCIA; and wireless communication methods such as infrared and radio frequency links.

89. The GSU of claim 78, wherein said host computing device further comprises a network communications interface to an information network.

90. The GSU of claim 89, wherein the network communications interface is realized a wireless communication method.

91. The GSU of claim 78, wherein said GSU is realized in the form of an integrated circuit (IC) chip.

92. The GSU of claim 78, wherein said GSU and said host computing device are realized in the form of an integrated circuit chip.

93. The GSU of claim 64, which further comprises a high-frequency GPS disciplined clock, interfaced with said central processor, for providing much higher resolution time-stamps (TS).

94. The GSU of claim 64, which further comprises a stand-alone encryption and decryption module, interfaced with said central processor, for providing enhanced speed and security.

95. The GSU of claim 64, wherein said client machine is used in a time-constrained competition against other client machines as in the case of a competitive situation selected from the group consisting of a contest against another machine, a contest against oneself under the constraint of a clock as the case of testing, and a contest against changing supply and demand conditions in a market as in the case of real-time securities, commodities, or currency trading, and other forms of real-time and non-real-time auction processes.

96. An Internet-based system for enabling a competition among a plurality of participants over the Internet, comprising:

- a primary server having an embedded GPS (global positioning system) receiver;
- one or more web servers for providing information about the competition;
- a login server;
- a competitor database;
- an invitation to respond/response database;

00514500-022000

5

102. The system of claim 97, wherein each said client machine comprises a global synchronization unit (GSU) and various hardware and software layers, including client software such as a contest client application, contest plug-in, and contest hooks and drivers.

10

103. The system of claim 97, wherein each said client machine is equipped with a GSU and connected through the Internet to a server equipped with a GPS clock unit, where input and output devices are connected to said client machine through said GSU.

15

104. The system of claim 97, wherein said global synchronization unit (GSU) comprises a GPS antenna, GPS receiver, central processor, host computer interface, GPS disciplined high-frequency clock, encryption and decryption module, non-volatile memory, input device monitor and passthrough module, and an output passthrough and signal generation module.

20

105. The system of claim 97, wherein said game server comprises various hardware and software layers including a game server daemon and GPS receiver.

25

106. The system of claim 99, wherein each said web server comprises web server software providing support for HTML, Java, and other standard protocols and web technologies.

30

107. The system of claim 97, wherein said primary server comprises a primary server daemon, a contest management interface, a high precision clock or timer, high performance network interface, and a GPS receiver.

35

108. The system of claim 97, wherein said login server comprises a login server daemon and a high performance network interface.

109. The system of claim 97, wherein the flow of data and messages between a web server and said client machine includes web site content transmitted from said web server to the client machine, encrypted registration information posted to said web server from said client machine, preliminary contestant username and password sent to said client machine, and contest software downloaded from said web server to said client machine.

05544550.022000

110. The system of claim 97, wherein the flow of data and messages between said primary server and said login server employed includes a list of game servers sent from said primary server to said login server.

111. The system of claim 97, wherein the flow of data and messages between one said game server and said login server includes a request for game server status by said login server, and the request includes the login server's public key for encryption, and wherein the data flow also includes an encrypted reply by the game server to said login server containing status and loading information about the game server, as well as the game server's public key for encryption use by the login server and client machine, and wherein the data flow also includes an encrypted contestant login request from said login server to the game server and a corresponding encrypted reply from the game server to said login server containing a game server access code.

112. The system of claim 97, wherein the flow of data and messages between said login server and a client machine, includes an encrypted contestant login request from the client machine to said login server, a message containing an encrypted contestant ID sent from the login server to the client machine, and an encrypted message from said login server to the client machine containing a game server address and associated game server access code.

113. The system of claim 97, wherein the flow of data and messages between one said game server and one said client machine includes a message from the client machine to the game server containing a contestant ID, a game server access code, and a client machine public key, an additional message from the game server to the client machine containing the game server public key, an additional message from the game server to the client machine containing an encrypted query and start-time, a further message from the game server to the client machine containing an encrypted query decryption key, a further message from the client machine to the game server containing a response notification hash, a further message from the client machine to the game server containing the encrypted response data and security verification hash, a further message from the game server to the client machine containing the security log request, a further message from the client machine to the game server containing the encrypted security log, a final message from the game server to the client machine containing the contest results.

14. The system of claim 97, wherein the flow of data and messages between the primary server and a game server, includes a message from the game server to the primary server containing the game server public key, an additional message from the primary server to the game server containing the primary server public key, a further encrypted message from the primary server to the game server containing the encrypted query, encrypted start-time, and encrypted answer, a further message from the game server to the primary server containing the encrypted preliminary results for the contest, a further message from the primary server to the game server containing an encrypted security analysis request, a further message from the game server to the primary server containing the encrypted security analysis results, a final message from the primary server to the game server containing the encrypted contest results.

115. The system of claim 97, wherein the flow of data and messages between the primary server and a web (http) server, includes game announcements delivered via ftp from said primary server to said web server, and additional data delivered via ftp from said primary server to said web server includes contest results and contestant standings.

116. An Internet-based financial trading-based system comprising:

- a primary server equipped with a global positioning system (GPS) receiver and associated antenna;
- one or more web servers;
- a login server;
- a trader database;
- a real-time market state server;
- one or more real-time price-quotation and trading (RTPQ&T) servers; and
- a set of client machines,

wherein each said client machine is provided with trading client software, and wherein said login server is also connected to said trader database.

117. An Internet-based auction-supporting system having system components comprising:

- a primary server with an embedded GPS receiver and associated antenna;
- one or more web servers;
- a login server;
- a bidder database;
- an auction database;
- one or more auction servers with embedded GPS receivers; and

one or more client machines with an embedded Global Synchronization Units (GSU),

wherein all system components are interconnected to the infrastructure of the Internet.

118. The Internet-based auction-supporting system of claim 117, which further comprises virtual network connections between said primary server and a set of said auction servers, as well as between each said auction server and an associated set of said client machines.

119. The Internet-based auction-supporting system of claim 117, which further comprises a plurality of mirrored web servers, each being connected to said bidder database and each serving a set of said client machines, and each said client machine being equipped with a web browser.

120. The Internet-based auction-supporting system of claim 117, wherein each said client machine is provided with a bidding client, and said login server is connected to said bidder database.

121. The Internet-based auction-supporting system of claim 117, wherein each said client machine comprises a global synchronization unit and various hardware and software layers, including client software such as an auction client application, auction plug-in, and auction hooks and drivers.

122. The Internet-based auction-supporting system of claim 117, wherein said auction server comprises various hardware and software layers including an auction server daemon and GPS receiver.

123. The Internet-based auction-supporting system of claim 117, wherein said web server includes web server software providing support for HTML, Java, and other standard protocols and web technologies.

124. The Internet-based auction-supporting system of claim 117, wherein said primary server includes the primary server daemon, an auction management interface, a high precision clock or timer, high performance network interface, and a GPS receiver.

00514598.022600

125. The Internet-based auction-supporting system of claim 117, wherein said login server includes the login server daemon and a high performance network interface.

126. The Internet-based auction-supporting system of claim 117, wherein the flow of data and messages between a web server and one said client machine includes web site content transmitted from the web server to the client machine, encrypted registration information posted to the web server from the client machine, preliminary bidder username and password sent to the client machine, and auction software downloaded from the web server to the client machine.

127. The Internet-based auction-supporting system of claim 117, wherein the flow of data and messages between the primary server and the login server includes a list of auction servers sent from the primary server to the login server.

128. The Internet-based auction-supporting system of claim 117, wherein the flow of data and messages between an auction server and the login server includes a request for auction server status by the login server, and the request includes the login server's public key for encryption, and wherein the data flow also includes an encrypted reply by the auction server to the login server containing status and loading information about the auction server, as well as the auction server's public key for encryption use by the login server and client machine, wherein the data flow also includes an encrypted bidder login request from the login server to the auction server and a corresponding encrypted reply from the auction server to the login server containing a auction server access code.

129. The Internet-based auction-supporting system of claim 117, wherein the flow of data and messages between the login server and a client machine, includes an encrypted bidder login request from the client machine to the login server, a message containing an encrypted bidder identification sent from the login server to the client machine, and an encrypted message from the login server to the client machine containing an auction server address and associated auction server access code.

130. The Internet-based auction-supporting system of claim 117, wherein the flow of data and messages between an auction server and a client machine, includes a message from the client machine to the auction server containing a

09514596-022800

bidder ID, an auction server access code, and a client machine public key, an additional message from the auction server to the client machine containing the auction server public key, an additional message from the auction server to the client machine containing an encrypted minimum and start-time, a further message from the auction server to the client machine containing an encrypted bid decryption key, a further message from the client machine to the auction server containing a response notification hash, a further message from the client machine to the auction server containing the encrypted response data and security verification hash, a further message from the auction server to the client machine containing the security log request, a further message from the client machine to the auction server containing the encrypted security log, a final message from the auction server to the client machine containing the auction results.

131. The Internet-based auction-supporting system of claim 117, wherein the flow of data and messages between the primary server and said auction server, includes a message from the auction server to the primary server containing the auction server public key, an additional message from the primary server to the auction server containing the primary server public key, a further encrypted message from the primary server to the auction server containing the encrypted auction, encrypted start-time, and encrypted answer, a further message from the auction server to the primary server containing the encrypted preliminary results for the contest, a further message from the primary server to the auction server containing an encrypted security analysis request, a further message from the game server to the primary server contains the encrypted security analysis results, a final message from the primary server to the auction server containing the encrypted auction results.

132. The Internet-based auction-supporting system of claim 117, wherein the flow of data and messages between the primary server and a web server includes auction announcements delivered via ftp from the primary server to the web (http) server, and additional data delivered via ftp from the primary server to the web server includes auction results and bidder standings.

133. An Internet-based contest-promoting subsystem comprising:
one or more remote administration consoles;
a contest database; and
a remote administration server for remotely creating and administering contests over the Internet.

054598-022800

134. A system for remote administration of contests over the Internet, comprising:

a virtual network of connections between a primary server and a remote administration server, between the remote administration server and a contest database, a contestant database, and a query answer database, as well as between said remote administration server and one or more remote administration consoles.

135. The system of claim 134, wherein a remote administration console employed in said system comprises administration software being comprised of a remote administration client application and a remote administration plug-in.

136. The system of claim 134, wherein said remote administration server comprises various hardware and software layers, including the remote administration web server and the remote administration daemon.

137. A subsystem for providing a competition-promoting systems with a television-based spectator interface, comprising:

a web server;
a video-enabled client machine;
a web-to-video processor;
tape video content playback unit;
live video source (e.g. camera);
a real-time video compositor;
broadcasting equipment; and
television viewers.

138. A display layout for displaying contest live video, contestant images, and live contest queries, results, scores and statistics on a television-based spectator interface.

139. A television-based client machine comprising:

a set-top client machine connected to the user's television set using a standard NTSC or PAL cable; and
a remote-control input device for controlling the client machine.

140. The television-based client machine of claim 139, wherein said set-top client machine comprises

09514598.022800

5 a GPS receiver and associated antenna,
clock and timer hardware;
a television tuner with decoding capabilities;
a modem;
audio/video output;
embedded device drivers;
an embedded operating system with Java capability running on a
microprocessor; and a
firmware contest client.

10 141. An Internet-based competition-promoting system for fairly and securely
enabling one or more time-constrained competitions among a plurality of
competitors simultaneously presented with the same set of data, comprising:

15 a first subsystem for transmitting an Invitation-to-Respond, or ITR, to each
of the competitors participating in the competition promoted by said system in a
regulated manner; and

a second subsystem for responding to each ITR presented to said
competitors, by submitting an appropriate response or undertaking a particular
action;

20 wherein each competitor's response is the timed to ensure fairness in the
competitive activity, and thus precisely measured, securely recorded and
analyzed.

25 142. The Internet-based competition-promoting system of claim 141, wherein
said same set of data (i.e. in a globally time-synchronized manner) is data
selected from the group consisting a question to be answered, and a problem,
puzzle or riddle to be solved.

30 143. The Internet-based competition-promoting system of claim 141, wherein
said competitors are selected from the group consisting of human beings,
programmed computers, and sophisticated androidal machines.

35 144. The competition-promoting system and method of claim 141, wherein said
time-constrained competition is an activity selected from the group consisting of
multi-player timed problem-solving games, puzzles, or contests; on-line real-time
auctions, on-line real-time trading of securities (e.g. stocks and bonds),
commodities, and foreign currencies; on-line real-time auctions; on-line
educational testing; on-line career testing; on-line aptitude testing; on-line
intelligence quotient (IQ) testing; and other real-time activities wherein

Simultaneous presentation of information to a plurality of competitive entities or accurate presentation of IRQs to and collection of responses thereto from one or more human subjects, is critical to the competitive or otherwise time-constrained activity at hand, in order to ensure fundamental principles of fairness and fair play expected by participants, spectators, and sponsors alike.

145. An Internet-based competition-promoting system having system components comprising:

a primary server for providing as a source of Invitations-to-Respond and other competition related data; providing a master clock for the system; and performing functions or operations involving data received from multiple client machines connected to the system;

a login server for accepting login requests from each competitor's client machine and assigning an appropriate competition-promoting server to that client machine, providing a single address for each client machine to use to contact the assigned competition-promoting server when initializing a session in the competition, and intelligently distributing the processing and communications load among the competition-promoting servers;

a competitor database for recording information about each competitor for the proper operation of the competition;

an Invitation-To-Respond/Response (ITR/Response) database for storing or generating Invitations-To-Respond (ITRs) appropriate to the particular competition being promoted, and transmitting those ITR's to said client machines, through the other servers in the system;

one or more competition-promoting servers; and

a plurality of client machine for use by a plurality of competitors, wherein each said competitor interacts with said competition-promoting system through one said client machine, and

wherein said system components are interconnected through the infrastructure of the Internet.

146. The Internet-based competition-promoting system of claim 145, said competitor database records items of information about each said competitor, selected from the group consisting of his or her identity, preferences, contact information, and any other data deemed necessary for the proper operation of the competition.

147. The Internet-based competition-promoting system of claim 145, wherein said ITR/Response database contain canonical responses for comparison with the

actual responses generated by the competitors, as well as other information necessary for the conducting of the competition.

148. The Internet-based competition-promoting system of claim 145, wherein each said client machine includes a global synchronization unit (GSU), whereas each said competition-promoting server includes a GPS receiver.

149. The Internet-based competition-promoting system of claim 145, wherein said global positioning unit (GSU) employed by the competition-enabling system comprises:

a plurality of GPS receivers operating in conjunction with an array of GPS satellites occupying a geodesic orbit.

150. The Internet-based competition-promoting system of claim 145, wherein said primary server communicates indirectly with said client machines through a number of competition-promoting servers, wherein said competition-promoting servers relay Invitations-To-Respond and other data to the client machines, and receive responses thereto from those client machines.

151. The Internet-based competition-promoting system of claim 145, wherein said competition-promoting servers perform preliminary processing and sorting of the client machine responses and these pre-processed results are then passed back to said primary server.

152. The Internet-based competition-promoting system of claim 145, wherein each said competitor uses one said client machine to receive and view the Invitations-To-Respond (ITR), as well as to enter and transmit the responses thereto.

153. The Internet-based competition-promoting system of claim 145, wherein said client machine comprises a personal computer, augmented by the addition of several software and hardware components, including a global synchronization unit (GSU) 175 installed in the client machine to provide precisely time-stamp client-responses, referred to as client-events, traceable to internationally standardized reference clocks.

154. The Internet-based competition-promoting system of claim 145, wherein said GSU within each client machine performs decryption operations, generates digitally-signed time and space stamps of various internal and external events at

the client machine, and supports timed decryption and presentation of data to the competitor.

155. The Internet-based competition-promoting system of claim 145, wherein each computer or device in the system will establish a connection or connections to one or more of the other computers through the communications network

156. The Internet-based competition-promoting system of claim 145, wherein said connections are virtual connections established through said communications network such as the Internet.

157. The Internet-based competition-promoting system of claim 145, wherein said communications network comprises a packet-switched data communications network running the popular Transmission Control Protocol/Internet Protocol (TCP/IP).

158. The Internet-based competition-promoting system of claim 145, wherein each said competition server connected to said communications network has a statically assigned IP address, whereas each said client machine connected thereto has either a statically or dynamically assigned IP address.

159. An Internet-based contest-promoting system for enabling a plurality of contestants to participate in a multi-player internetworked time-constrained contest that is regulated in a secure and fundamentally fair manner, comprising:

an information server for supporting a contest process over the Internet and producing invitations to respond (ITR) for response to said contestant in a time-constrained manner;

a plurality of client machines, each said client machine for use by one said contestant to interface with the contest process, receive an ITR (i.e. images, text, video, play audio streams) displayed in a globally time-synchronized manner, receive a response to the ITR from the contestant in a time-constrained manner, time-stamping said response at the client machine, and transmitting the response and corresponding time-stamp to said information server;

said information server including means for evaluating and ranking said contestants are according to their responses and corresponding time-stamps;

means for registering contestants participating in the contest;

means for controlling and measuring certain time-based elements of the contest (e.g. the precise instant at which an ITR is presented to the contestants) on all or some subset of the client machines.

wherein said time-based elements shall include the "start-time" which is the same for each contestant,

wherein the contest-promoting system includes means for precisely determining the length of time between the start-time and the instant each contestant submits its response which provides the finish-time of the particular contestant,

wherein the length of time, measured between said start-time and said finish-time, provides the response-time of the particular contestant or competitor.

160. The Internet-based contest-promoting system of claim 159, wherein said ITRs (e.g. queries) are simultaneously presented to each and every client machine registered to compete in the contest.

161. The Internet-based contest-promoting system of claim 159, wherein each client machine incorporates a global positioning system (GPS) receiver, and a local clock contained in an embedded or peripheral device to provide a precise timing reference (e.g. accurate to within 1 microsecond of international atomic clock standard time).

162. The Internet-based contest-promoting system of claim 159, wherein said GSU are programmed to decode and present the ITR in a secure manner at the precise moment desired.

163. The Internet-based contest-promoting system of claim 159, wherein each client machine includes a local clock that is characterized, or analyzed to determine the functional relationship between the local clock time and the global time as determined by a single master clock for the entire contest system, wherein the global time may be determined from the local clock reading.

164. The Internet-based contest-promoting system of claim 159, wherein the display update cycle on each client machine is skewed so that a display update completes exactly at the desired "start time" which is determined to be the same for each every contestant, regardless of their location on the planet.

165. The Internet-based contest-promoting system of claim 159, wherein said characterization of the local clock is performed using an accurate clock connected to the client machine, or using security enhanced versions of the methods and algorithms used in the network time protocol (NTP).

0514530-022000

166. The Internet-based contest-promoting system of claim 159, wherein said contest-promoting system further comprises security measures for detecting (and thereby discouraging) cheating by dishonest contestants.

167. The Internet-based contest-promoting system of claim 166, wherein said security measures comprise the use of encryption of the majority of messages between the various computers in the system, and by monitoring and logging the contest-related activities of participating client machines.

168. An Internet-based contest-promoting system for supporting a contest among a large number of contestants, comprising:

a subsystem for handling transmission of the queries and responses from all of the client machines employed in the contest, said subsystem including a hierarchy of servers comprising a primary server, plurality of game servers and client machines,

wherein said primary server acts as the root node of a tree-type interconnection of computers, wherein the "leaves" of the tree structure are formed by the client machines connected to the system, and

a layer of game servers act as intermediaries (or "branch structures") between said primary server and the client machines.

169. The Internet-based contest-promoting system of claim 168 wherein, each game server, client machine, and primary server is equipped with a GPS receiver used to synchronize the local clock and the display of each client machine participating in the contest-promoting system.

170. The Internet-based contest-promoting system of claim 168 wherein, management of time synchronized messaging with each client machine can be carried out by the game server associated with that client machine, rather than by the primary server.

171. A method of registering a contestant with an Internet-based contest-supporting system, comprising the steps of:

(a) registering a client machine with said Internet-based contest supporting system by filling out a web-based form containing personal and client machine information and submitting said completed form to a web server;

successfully, logged on to the game server chosen for the client machine by the login server.

191. A method of downloading an encrypted query and start-time to the client machine comprising the steps of:

- (a) human operators entering the questions and associated answers relating to a particular contest into the query/answer database;
- (b) at some point before the contest begins, the game server sends to the primary server, a message containing its public encryption key.
- (c) primary server sends to the game server, a message containing its public encryption key;
- (d) when a particular contest is created, accessing the system through the contest management interface, and selecting queries from the database to be used in the contest;
- (e) for each query, assigning a desired start-time;
- (f) for each query and start-time, the primary server generates a unique set of query encryption and decryption keys;
- (g) using the query encryption key, the primary server encrypts the query;
- (h) the primary server creates a message containing the encrypted query, the query decryption key, and the desired start-time;
- (i) the entire message is encrypted using the game server's public encryption key;
- (j) entire message is sent from the primary server to the game server;
- (k) upon receiving the message from the primary server, the game server decrypts the message and creates a new message, and the new message is encrypted by the game server using the client machine's public key;
- (l) the resulting encrypted message is sent to the client machine;
- (m) the client machine decrypts the message, and stores the encrypted query contained within, along with the start-time on the client machine;
- (n) the client machine creates and begins appending data to a security verification log file, and the resulting encrypted file will contain a variety of information about the timing of the query/response process;
- (o) the security verification log recording the arrival-time (in local time) of the encrypted query from the game server.

192. A method of characterizing the local clock on a client machine and synchronizing the display update cycle of the client machine for a system that utilizes a GSU, said method comprising the steps of:

- (b) testing and qualifying said client machine using either browser plug-ins or stand alone test programs downloaded from said web server; and
(c) downloading contest client software to said client machine.

172. A method of registering a contestant with a contest-supporting system, comprising the steps:

(a) collecting and recording information about each contestant desiring to participate in a scheduled contest, said information including, for example, the name, address, telephone number(s), E-mail address, and any other information required or desired of each contestant by the contest organizer and/or sponsor(s);

(b) choosing or assigning an identification number (or "handle") and a password, in order to protect their access to the contest process;

(c) at registration time, performing a number of tests on the contestant's system, said tests can be used to qualify the client machine to be used by the contestant, by determining whether it meets certain requirements necessary to successfully participate in the contest.

(d) recording data produced as a result of these tests, either on the client machine or on one of the servers;

(e) using said data, in conjunction with other information collected during and/or after the contest, to help determine whether the contestant participated fairly in the competition;

(f) downloading before the contest, any programs, installable components, and plugins, as well as any data required by them; and

(g) using said programs, components, and plugins, along with a browser or other programs already present on the contestants system, to present advertising and other information and content to the contestant, as well as to perform all operations of the contest on the client machine.

173. A system for distributing and presenting Web documents (with or without Java or Active-X applets) and associated web content to the contestants, comprising:

- a set of Web-enabled client machines equipped with web browsers; and
- a contestant database for storing registration and other information;
- a master web server for storing and providing the web site content to a set of client machines, utilizing HTTP, FTP, and other standard Internet protocols;
- a plurality of mirrored web servers, wherein each web server is connected to said contestant database and each serves a set of Web-enabled client machines equipped with web browsers;

15
Barf

10

0544536.022000
15
20

25

30

35

said master web server transmits copies of the entire contest web site to the mirror web servers, which then are each able to serve a large number of client machines;

wherein each of the web servers has access to said contestant database; said web servers also distribute the contest client software (340) using the HTTP or FTP protocols.

174. The system of claim 173, wherein said Web document comprises an HTML (or XML) encoded document

175. A method of handling communication in a multi-player contest using multiple game servers to handle communication with all client machines in a contest-promoting system, said method comprising:

(a) using a client machine to initially connect to the contest-promoting system through a login server located at a known Internet address;

(b) using login server to choose which game server should be utilized by this contestant's client machine, said choice being based on a variety of information, including the location of the client machine, the characteristics of the connection to the client machine, and the number and characteristics of the connections already assigned, or anticipated to be assigned, to the game servers in the system;

(c) using load balancing algorithms to distribute the connections to the game servers, thereby minimizing the possibility of overwhelming any one server, and insuring consistent connections for all the game clients.

176. The method of claim 175, wherein all said client machines receive their game server assignments from a single login server.

177. The method of claim 175, wherein each client machine is running the contest client software for interfacing said client machine with said game server by logging in through said login server.

178. The method of claim 175, wherein said the login server accesses the contestant database to check passwords and the status of the contestant.

179. A method of enabling a contestant to compete against many other contestants, in a secure and fundamentally fair time-constrained contest, over the Internet, wherein each contestant is provided with a common "start-time" regardless of the location of his or her client machine on the infrastructure of

the Internet, for the type of interconnection provided thereto, said comprising the steps of:

(a) registering each user as a contestant using a web browser;

(b) creating a globally-synchronized and secure networked client machine through which the contestant may participate in a timed-constrained question and answer type contest, while competing against large numbers of other contestants for potentially high stakes.

(c) using the contest client software on the client machine to log on to the game server, and the establish a communication channel therewith;

(d) transmitting the query and start-time from the primary server to the client machine;

(e) characterizing the client machine's local clock with the master clock on the primary server, and synchronizing f the client machine display update cycle with the desired start-time for the contest;

(f) presenting the query to the contestant precisely at the start-time, as determined by a local clock that is characterized with respect to a global master clock located on the primary server;

(g) accepting the contestants response, attaching a time-stamp to that response, and transmitting the response and time-stamp to the servers;

(h) judging the responses from all the contestants and determining the winner.

180. The method of claim 179, wherein said method further comprises

(i) determining each contestant's standing or rank for the contest.

181. The method of claim 179, wherein step (a) comprises browsing a contest WWW site ("the contest web site") containing information about the contest, including descriptions of the contest client software, contestant qualifications, contest regulations, instructions on how to play, information about different varieties of the contest, lists of prizes and awards offered, advertising, lists of contest sponsors, lists of previous winners, and the standings or ranks of other contestants.

182. The method of claim 179, wherein step (a) comprises a flow of information between the user's client machine and the web server containing HTML (and/or XML) encoded documents comprising the contest web site.

183. The method of claim 179, wherein step (a) comprises the user registering to become a contestant involving the user filling out an on-line registration form,

using either standard HTML (or XML) forms, or forms generated by Java or Active-X applets, or by a CGI script in a manner well known in the art.

184. The method of claim 179, wherein step (a) comprises the user performing some test either of their own abilities and/or of the capabilities of their computing system, said tests being administered through forms along with the registration process, or could involve the user downloading and running customized plug-in modules or stand-alone applications on his or computing system.

185. The method of claim 179, wherein step (a) further comprises:

said web server creating a record in the contestant database for this user upon completing receipt of the registration information therefrom;

storing the registration information in this record;

establishing the user as a contestant permitted to participate in one or more on-line multi-player contests to be promoted (i.e. enabled) the system of the present invention;

assigning a contestant ID to the new contestant, said ID code uniquely identifying the contestant for all time, unlike a username, password, e-mail address or other information that may be changed in the future by this player/contestant;

recording the contestant ID in the contestant database, and using the same internally by the contest software of the system.

assigning the contestant a username and a temporary password for use when playing the contest, said username being assigned by the system, or being chosen by the user as a part of the registration procedure, said password being generated randomly, and said username and password being stored in the contestant database;

sending an e-mail message containing the username and temporary password to the contestant;

logging said contestant onto a secure, members-only area of the contest web-site using his or her username and temporary password, said area allowing the contestant to view and update his or her personal information (e.g. username, password, e-mail address, residence address and telephone numbers, and so on);

downloading the contest software from the web server to his or her client machine, i.e. from the members-only area of the contest web site, said contest software being download using HTTP, FTP, or other file transfer protocol;

Band
5

installing the client contest software on client machine, said installation installing contest client application, as well as one or more customized device drivers required by the contestant's client machine, said device drivers being used to communicate directly with the local clock and any timing hardware (GPS, etc) used in the client machine,

thereby enabled the client machine for participation in a contained competition

186. A method of logging a contestant onto a game server using a client machine connected to a contest-promoting system having a log-in server, and a plurality of game servers, said method comprising the steps of:

(a) providing all servers and client machines in the system with the address of said login server as well as with the login server's encryption "public key", which is used to send secure message to said login server;

(b) transmitting a list of all the participating game servers from said primary server to said login server, said message being encrypted using said login server's public key;

(c) said login server decrypting and storing said message using said login-server private key;

(d) sending a status request message from said login server to each of said game servers;

(e) each said game server sending a reply in response to the status request message, containing information about the status of the game server, including current loading, indications of maximum server capacity, geographical area of coverage, and other information,

wherein said reply contains the game server's public encryption key, and the entire reply is encrypted using the login server's public key;

(f) said contestant logging on to the system using the contest client application when the contestant decides to installation of the client software, participate in a particular contest;

said contest client machine requesting a username and password from the contestant for the convenience of the contestant;

(optionally, storing said username and password locally on said client machine to avoid the contestant having to re-enter the username and/or password every time he or she plays a game or participates in a contest)

(g) said contest client software transmitting the username and password to the login server;

0514500.022000

encrypting the username, password, and the client machine's public key using said login server's public key, and sending the resulting login request from the client machine to said login server;

(h) login server decrypting the login request, obtaining the username and password, said username and password being obtained by performing a lookup operation in the contestant database, thereby obtaining a contestant ID;

(i) transmitting said contestant ID to the client machine and said client machine storing said ID for later use;

(j) said login server selects an appropriate game server for this contestant, based on loading, geographical location, and other factors;

(k) upon selecting a game server, the login server sending a login request containing the contestant ID and the client machine address to the selected game server, said message being encrypted using the game server's public key;

(l) If the login request is granted, then the game server creates a message containing a game server access code, encrypted using the login server's public key;

(m) sending said message (containing the game server access code) from the game server to the login server; and

(n) creating the game server access code (key) using the contestant ID and the client machine address, said code only allowing the specified contestant to log in using that code.

187. The method of claim 187, wherein further the login server decrypts the message, and then creates a new message containing the game server's address and the game server access code, and then encrypts the new message using the client machine's public key, and sent from the login server to the client machine.

188. The method of claim 187, wherein further the client machine decrypts the message containing the game server address and the game server access code using its private decryption key.

189. The method of claim 188, wherein further the client machine then creates a message containing the contestant ID, the game server access code, and a client machine public encryption key, and then the message is sent from the client machine to the game server specified by the game server address received from the login server.

190. The method of claim 189, wherein further the game server responds with message containing the game server public key, and then the client machine has

adjusting the display refresh cycle such that a cycle completes precisely at the desired start-time;

measuring the video refresh rate of the video display adapter in the client machine, wherein said video display adapter has a set of registers used to control and monitor the scanning and refresh periods and rates;

query the display adapter to determine whether it is currently in a vertical retrace period or not, over a period of time;

recording the local clock time each time the display enters vertical retrace, the period and phase of the display update cycle is determined with respect to local clock time;

by reading the display adapter registers, determining the difference between the time the last line of the displayed image is drawn and the beginning of the next vertical retrace;

using this calculated period and phase, extrapolating the display times forward in time to find the display time closest to the desired start-time;

calculating the error (E_d) between the display time (t_d) and the desired local clock start time (t_i);

throughout this process, ~~depending~~ the times associated with each vertical retrace to the security verification log;

minimizing the error term E_d is by shifting the phase of the display update cycle; and

adjusting the phase of the display update cycle is by increasing or decreasing the display update period over a number of update cycles in order to minimize E_d and completely display the query at the desired start-time.

193. A method of presenting an encrypted query to a GSU-enabled client machine at a contest start-time associated with a contest-promoting system, wherein the encrypted query and start-time have been stored on the GSU-enabled client machine, and the display time has been aligned with the contest start-time, said method comprising the steps of:

(a) the GSU-enabled client machine uploads the encrypted query and start time to the GSU within the GSU-enabled client machine, said GSU-enabled client machine having video memory and a display;

(b) a short time prior to the desired start-time, the GSU decrypts the query, and then said query is downloaded to the GSU-enabled client machine;

(c) the query is then rendered into a off-screen image and stored in an off-screen memory area in preparation for presentation on the display;

(d) during the vertical retrace period that is one cycle before the display time, the off-screen image is flipped to the display;

000220-06547560

(e) with the query image now residing in the currently displayed video memory, the GSU-enabled client machine display draws the query onto the screen, reaching the bottom of the display at the start-time for the contest; and

(f) the GSU-enabled client machine records the local time at the moment the vertical retrace begins, which should be simultaneous with the desired start-time.

194. The method of claim 193, which further comprises:

(g) the local time is also stored in the security verification log;

(h) after the image is displayed, the client machine continues to monitor the clocks and timing systems on the GSU-enabled client machine (e.g. system timer, real time clock, CPU cycle counter, vertical retrace signal, etc); and

(i) information about the clocks is stored in the security verification log.

195. A method for presenting an encrypted query to a GSU-enabled client machine at a contest start-time associated with a contest-promoting system, wherein the encrypted query and the contest start-time have been stored on the GSU-enabled client machine, said method comprising the steps of:

(a) the client machine uploads the encrypted query and start time to the GSU of said GSU-enabled client machine, said GSU-enabled client machine having a display and the GSU having display memory;

(b) the GSU decrypts the encrypted query immediately prior to the contest start-time;

(c) the decrypted query is then rendered by the GSU into said display memory; and

(d) the GSU overrides the display, using its own synchronized refresh rate, and presents the query precisely at the contest start-time.

196. A method of presenting an encrypted query to a client machine at a contest start-time associated with a contest-promoting system having a contest server, wherein the encrypted query has been stored on the client machine, the start-time is known in terms of the local clock, and the display time has been aligned with the desired start-time, said method comprising the steps of:

(a) contest server transmitting the query decryption key to the client machine, said client machine having video memory and a display;

(b) the client machine decrypts the query upon receipt of the query decryption key, and the local clock time of the receipt of the query decryption key is recorded in a security verification log;

00544598-022800

(c) the query is then rendered into an off-screen image and stored in an off-screen memory area, in preparation for presentation on the display;

(d) during the vertical retrace period that is one cycle before the display time, the off-screen image is flipped to the display; and

(e) with the query image now residing in the currently displayed video memory, the client machine display draws the query onto the screen, reaching the bottom of the display at the contest start-time.

197. A method of submitting a time-stamped contestant response to a query presented to a GSU-enabled client machine by a contest server associated with a contest-promoting system, said method comprising the steps of:

(a) entering the response into the GSU-enabled client machine, said GSU-enabled machine having a GSU;

(b) sending the response to the GSU, which generates digitally signed data package containing the time and space stamp for the response;

(c) within the GSU, appending the time and space stamp to the security verification log.

(d) sending the time and space-stamp from the client machine to the contest server; and

(e) the contest server requesting the actual (i.e. full) response from the client machine by sending a response request message.

198. The method of claim 197, which further comprises:

(f) if requested, the client machine encrypts the response, the response time-stamp, and a hash-value of the security verification log in order to create a message; and

(g) sending the message to the contest server and closing and write-protecting the security verification log.

199. A method of submitting a time-stamped contestant response to a query presented to a GSU-enabled client machine by a contest server associated with a contest-promoting system, wherein the GSU-enabled client machine has a GSU with a GSU passthrough connection and an input device connected directly thereto, said method comprising the steps of:

(a) contestant uses the input device to enters the response into the GSU-enabled client machine through said GSU passthrough connection;

(b) the GSU automatically generates a digitally signed time and space stamp for the response;

(c) the time and space-stamp is appended to the security verification log;

(d) sending the time and space stamp from the client machine to the game server; and

(e) the contest server requests the actual response from the GSU-enabled client machine by sending a response request message.

200. The method of claim 199, which further comprises:

(f) if requested, the GSU-enabled client machine encrypts the response, the response time-stamp, and a hash-value of the security verification log to create a message; and

(g) the GSU-enabled client machine sends the message to the contest server and closing and write protecting the security verification log.

201. A method of submitting a time-stamped contestant response to a query presented to a client machine by a contest server associated with a contest-promoting system, said client machine having an interrupt handler and a customized low-level device driver, method comprising the steps of:

(a) the contestant enters a response into the client machine;

(b) response submission being detected by the customized low-level device driver;

(c) the interrupt handler in the client machine recording the local time-stamp corresponding to the moment the response was submitted to said client machine;

(d) appending this local time-stamp to a security verification log;

(e) upon receipt of the response submission, after recording the time-stamp, the client machine calculating a hash or CRC (cyclic redundancy check) value using the contestant's response and the local time-stamp;

(f) appending the hash value to the security verification log;

(g) sending a message containing the hash value and the response time, from the client machine to the contest server; and

(h) the contest server requests the actual (i.e. full) response from the client machine by sending a response request message.

202. The method of claim 201, which further comprises:

(i) if requested, the client machine encrypts the response, the response time-stamp, and a hash-value of the security verification log to create a message; and

(f) message is then sent to the contest server and the security verification log is closed and write protected.

CONFIDENTIAL

203. A method of promoting a contest over the Internet using an Internet-based contest-promoting system having a primary server, a one or more contest servers, a database and a plurality of client machines, and for fairly determining the winners of the contest, said method comprising the steps of:

- (a) as responses are received by each contest server from said client machines, comparing the responses with the correct answers in the database;
- (b) of those responses containing correct answers, comparing the time-stamps to rank the responses from fastest to slowest;
- (c) encrypting the sorted preliminary results using the primary server's public key;
- (d) sending the encrypted preliminary results (i.e. rankings), from the contest server to the primary server;
- (e) the primary server decrypting the encrypted preliminary results from each contest server;
- (f) merging the pre-sorted preliminary rankings from the contest server into a single sorted list of responses;
- (g) from the presorted list, the primary server calculating the overall ranking of the contestants and identifies the winner or winner(s) of the contest;
- (h) for each winning response, the primary server sends a security analysis request to the game server that is connected to the corresponding client machine of the contestant who submitted that response;
- (i) in response, each game server sends the security log, to the corresponding client machine;
- (j) the client machine transmits to the contest server, the security verification log, encrypted using the game server's public key;
- (k) the contest server decrypts and verifies the integrity of the security verification log using the hash-value of the security verification log;
- (l) the contest server uses the content of the security verification log to attempt to detect fraudulent activities;
- (m) the response notification hash is used to make sure the response sent is consistent with the response entered at the response notification time;
- (n) the contest server compiles the results from all the requested security logs for the client machines and transmits this message to the primary server;
- (o) upon receiving the compiled results from all the contest servers, the primary server either accepts, rejects, or flags the winning responses for further analysis by other means;
- (p) the primary server creates a revised list of winners based on these changes determined during step (o);

000220.9547550

(q) the revised list is encrypted using the contest server's public key and the resulting message is sent back to the contest server;.

(r) each game server in turn transmits the contest results message to each of the client machines; and

(s) sending a message containing the contest results from the primary server to a web server for posting on a contest web site.

204. A global synchronization unit (GSU) comprising:

means for performing actions in response to precise time and space conditions.

205. The GSU of claim 204, wherein the trigger for a time and space stamping action is constrained by timing, location, and/or velocity conditions of the GSU.

206. The GSU of claim 204, wherein said actions comprise events selected from the group consisting of the display of an image, the start of a video or audio clip, the decryption of data, and the running of a program on a host client machine.

207. A global synchronization unit (GSU) comprising:

means for generating secure and verifiable time-space stamp records of client-machine inputs and any other events captured by devices attached or otherwise connected to the GSU.

208. The GSU of claim 207, wherein said client-machine inputs are supplied from a communication line being asserted on the GSU input, or as complex as a set of patterns of inputs on a number of different inputs.

209. The GSU of claim 207, wherein the time-space stamp record generated by the GSU includes the location, exact time (e.g. to within +/- 1 microsecond).

210. The GSU of claim 207, wherein said GSU generates security information including, but not limited to, a hash or CRC (cyclic redundancy check) value derived from the input data associated with the event.

211. The GSU of claim 210, wherein said hash value allow the data to be verified in the future to insured that it has not been altered since the time/space stamp was generated.

circuitry for digitally signing said data package to produce a digitally signed data package.

219. The GSU device of claim 218, which further comprises

circuitry for authenticating that time and space stamp contained within said digitally data package, has not been modified since said time and space stamp was generated.

220. The GSU device of claim 218, wherein said input data is data selected from the group consisting of legal documents, tickets, certificates and financial instruments.

221. A system for performing an action on a client machine operably connected to the infrastructure of the Internet, said system comprising:

an information server equipped with a GPS receiver and associated antenna, and operably connected to the infrastructure to the Internet;

a GSU operably connected to said client machine;

wherein said information server sends an encrypted request to said client machine to perform an action at a predetermined event time, said encrypted request containing encrypted action data;

said encrypted request is then loaded into said GSU for decryption at said predetermined event time;

at some predetermined time before said predetermined event time, said GSU decrypts the encrypted action data and downloads the decrypted action data back onto said client machine for performance of said action,

thereby preventing access by said client machine or its operator to the action data before said predetermined event time.

222. The system of claim 221, wherein said action data comprises image data contained in said encrypted request, and the performance of said action comprises displaying said image data on a display device operably connected to said client machine.

223. A subsystem for creating and administrating contests promoted by a contest-promoting system supported over the Internet, said subsystem comprising:

a primary server operably connected to the infrastructure of the Internet;

a contest database operably connected to the infrastructure of the Internet, for containing information representative of questions and answers relating to one or more contests to be supported over the Internet;

a contest management interface software located on said primary server for use by the contest administrators to enter questions and answers into said contest database, design and specify contests, schedule contests, and monitor and control said contests.

224. The subsystem of claim 223, which further comprises a Web-enabled client machine for use by contest administrators to remotely enter questions and answers into said contest database, design and specify contests, schedule contests, and monitor and control said contests.

225. In a contest-promoting system having a primary server, a subsystem for producing and distributing a live television broadcast of a contest in progress, to television viewers viewing said live television broadcast on standard television sets throughout the world, said subsystem comprising:

a plurality of video-enabled client machines for capturing live video images and producing digital content;

Web-to-video processor for filtering, formatting and rendering (i) data generated by said primary server and distributed through said web server, and (ii) data transmitted by said video-enabled client machines, so as to produce digital content;

a video content playback unit for producing digital content in the form of prerecorded video information;

a live video source for producing digital content in the form of a live video stream;

a real-time video compositor for combining and laying out the digital content produced by one or more of said Web-to-video processor, said live video sources, and said taped video content playback sources; and producing a video signal representative of single unified view depicting the various aspects of a contest in progress; and

broadcasting equipment for broadcasting said video signal to television broadcasts.

226. The subsystem of claim 225, which further comprises a Web server for serving web-pages containing information about the content to be shown in said live television broadcast.

227. The subsystem of claim 225, wherein each said video-enabled client machine comprises a client machine having a video camera and associated video compression and transmission software.

228. The subsystem of claim 225, wherein said the real-time video compositor sends the final video signal to said broadcasting equipment, which transmits the video signal to the spectators television sets via cable, satellite, and/or radio waves.

229. A set-top television client machine for use in a contest-promoting system having a primary server for transmitting queries or Invitations to Respond (ITRs), comprising:

a television screen;

a local clock and timer hardware;

a GSU having GPS receiver for disciplining said local clock;

wherein said local clock is used to trigger the display of queries on said television screen, as well as to measure the elapsed time taken by the user when answering said queries (or submitting responses to said ITRs).

230. The set-top television client machine of claim 229, which further comprises an operating system having Java capability running on a microprocessor, and a firmware context client.

231. An Internet-based method for enabling a plurality of bidders to compete fairly in a bidding process for an item to auctioned over the Internet in accordance with a computer-administrated auction process involving the use of an auction server and a plurality of client machines competing in a bidding process, said auction server having a local clock and a GPS receiver for producing time-stamps referenced to a master clock, and each said client machine having a display device for displaying bid information, an input device for inputting bid information, and a GPS receiver for producing time-stamps referenced to said master clock, for application to information including bids input to said client machine, said Internet-based method comprising the steps of:

(a) said auction server transmitting encrypted bid information to each said client machine, and each said client machine storing said encrypted bid information for substantially simultaneous display on each said client machine at a predetermined globally-referenced start-time.

232. The Internet-based method of claim 231, which further comprises:

(b) ascertaining at each said client machine, the locally-referenced start-time of the bid process expressed in terms of the local clock at said client machine

233. The Internet-based method of claim 232, which further comprises:

(c) at each said client machine, aligning the display time of the encrypted bid information with said locally-referenced start-time.

234. The Internet-based method of claim 233, which further comprises:

(d) at said predetermined globally-referenced start-time, said auction server starts the bidding process for the item to be auctioned, by enabling the decryption of said bid information and simultaneous display thereof on each said client machine competing in the bidding process.

235. The Internet-based method of claim 234, which further comprises:

(e) said auction server accepting bids from said client machines for the item that are time-stamped after t_1 .

236. The Internet-based method of claim 235, which further comprises:

(f) each said client machine ~~competing~~ in the bidding process, sending a bid for the item to said auction server and time-stamping the time of transmission of the bid using said local clock at said auction server which has been characterized using said GPS at said auction server.

237. The Internet-based method of claim 236, which further comprises:

(g) said auction server receiving the bid from each said client machine competing in the bidding process and sending a bid at step (f) and time-stamping the time of receipt of the bid using said local clock at said auction server which has been characterized using said GPS receiver at said auction server.

238. The Internet-based method of claim 237, which further comprises:

(h) said auction server sending to each said client machine competing in the bidding process, a confirmation of the bid receipt containing the time-stamps applied at both the time of transmission and the time of receipt of the bid.

239. The Internet-based method of claim 238, which further comprises:

(i) said auction server updating all client machines competing in the bidding process with the highest bid information for the item;

(i) continuing the operations set forth at steps (c) and (d) until said auction server no longer receives any bids from any competing client machines for a first predetermined amount of time (e.g. x seconds); and

(j) said auction server sending all competing client machines a notice of final bids at time t_4 .

240. The Internet-based method of claim 239, which further comprises:

(k) said auction server waiting a second predetermined time period (i.e. y seconds) for a new bid from any client machine competing in the bidding process;

(1) at $t_4 + y$ seconds, said auction server closes the bidding process; and

(m) said auction server waiting z seconds for receipt of any bids from any of said client machines, time-stamped prior to $t_4 = y$ seconds.

241. The Internet-based method of claim 231, which further comprises:

(n) said auction server determining whether a new higher bid has been received from any client machines competing in the bidding process, and if so, then returning to Step (f); and

(o) if said auction server determines that at step (l) that no higher bids have been received, then said auction server determines that the item is sold to the competing machine transmitting the highest bid (i.e. the highest bidder), and then said auction server updates all said client machines with the final sales price at which the item has been sold.

242. The Internet-based method of claim 231, wherein said item is an article of value selected from the group consisting of antiques, financial securities (e.g. stocks and bonds), options, futures, commodities, foreign currency, consumer goods, personal articles and effects, real estate including tracts of land as well as condominiums, licenses to use intangible properties (e.g. bands of the electromagnetic spectrum, patents, etc.), transferable club memberships and subscriptions, and the like.

243. The Internet-based method of claim 231, wherein said item comprises multiple items in a multi-item combinatorial auction.

244. The Internet-based method of claim 231, wherein one or more of said client machines competing in said bidding process include intelligent software

enabling each said client machine to programmably engage in said bidding process with a reduced level of human participation.

245. An Internet-based system for enabling a plurality of bidders to compete fairly in a bidding process for an item to be auctioned over the Internet in accordance with computer-administrated auction process, said Internet-based system comprising:

an auction server having a local clock and a GPS receiver for producing time-stamps referenced to a master clock; and

a plurality of client machines, each said client machine being assigned to one bidder competing in the bidding process, and each said client machine having a display device for displaying bid information, an input device for inputting bid information, and a GPS receiver for producing time-stamps referenced to said master clock, for application to information including bids input to said client machine.

246. The Internet-based system of claim 245, wherein said computer-administrated auction process comprising the steps of:

(a) said auction server transmitting encrypted bid information to each said client machine, and each said client machine storing said encrypted bid information for substantially simultaneous display on each said client machine at a predetermined globally-referenced start-time.

247. The Internet-based system of claim 246, wherein said computer-administrated auction process further comprises:

(b) ascertaining at each said client machine, the locally-referenced start-time of the bid process expressed in terms of the local clock at said client machine

248. The Internet-based system of claim 247, wherein said computer-administrated auction process further comprises:

(c) at each said client machine, aligning the display time of the encrypted bid information with said locally-referenced start-time.

249. The Internet-based system of claim 248, wherein said computer-administrated auction process further comprises:

(d) at said predetermined globally-referenced start-time, said auction server starts the bidding process for the item to be auctioned, by enabling the

decryption of said bid information and simultaneous display thereof on each said client machine competing in the bidding process.

250. The Internet-based system of claim 251, wherein said computer-administrated auction process further comprises:

(e) said auction server accepting bids from said client machines for the item that are time-stamped after t_1 .

251. The Internet-based system of claim 250, wherein said computer-administrated auction process further comprises:

(f) each said client machine competing in the bidding process, sending a bid for the item to said auction server and time-stamping the time of transmission of the bid using said local clock at said auction server which has been characterized using said GPS at said auction server.

252. The Internet-based system of claim 251, wherein said computer-administrated auction process further comprises:

(g) said auction server receiving the bid from each said client machine competing in the bidding process and sending a bid at step (f) and time-stamping the time of receipt of the bid using said local clock at said auction server which has been characterized using said GPS receiver at said auction server.

253. The Internet-based system of claim 252, wherein said computer-administrated auction process further comprises:

(h) said auction server sending to each said client machine competing in the bidding process, a confirmation of the bid receipt containing the time-stamps applied at both the time of transmission and the time of receipt of the bid.

254. The Internet-based system of claim 253, wherein said computer-administrated auction process further comprises:

(i) said auction server updating all client machines competing in the bidding process with the highest bid information for the item;

(i) continuing the operations set forth at steps (c) and (d) until said auction server no longer receives any bids from any competing client machines for a first predetermined amount of time (e.g. x seconds); and

(j) said auction server sending all competing client machines a notice of final bids at time t_4 .

0514538.022800

Internet in accordance with a computer-administrated trading process involving the use of a price quotation and trading server (i.e. trading server) and a plurality of client machines competing in a trading process, said trading server having a local clock and a GPS receiver for producing time-stamps referenced to a master clock, and each said client machine having a display device for displaying price information, an input device for inputting offer to trade information (including a description of the property, an indication to buy or sell, and a price offer), and a GPS receiver for producing time-stamps referenced to said master clock, for application to information including offer to trade information input to said client machine, said Internet-based method comprising the steps of:

(a) said trading server transmitting encrypted offer to trade information to each said client machine, and each said client machine storing said encrypted offer to trade information for substantially simultaneous display on each said client machine at a predetermined globally-referenced start-time.

261. The Internet-based method of claim 260, which further comprises:

(b) ascertaining at each said client machine, the locally-referenced start-time of the trading process expressed in terms of the local clock at said client machine

262. The Internet-based method of claim 261, which further comprises:

(c) at each said client machine, aligning the display time of the encrypted offer to trade information with said locally-referenced start-time.

263. The Internet-based method of claim 262, which further comprises:

(d) at said predetermined globally-referenced start-time, said trading server starts the trading process for the property being offered for trading, by enabling the decryption of said offer to trade information and simultaneous display thereof on each said client machine competing in the trading process.

264. The Internet-based method of claim 263, which further comprises:

(e) said trading server accepting offer to trade from said client machines for the item that are time-stamped after t_1 .

265. The Internet-based method of claim 264, which further comprises:

(f) each said client machine competing in the trading process, sending a offer for trade an item of property to said trading server and time-stamping the

time of transmission of the offer for trade using said local clock at said trading server which has been characterized using said GPS at said trading server.

266. The Internet-based method of claim 265, which further comprises:

(g) said trading server receiving the offer for trade from each said client machine competing in the trading process and sending a offer for trade at step (f) and time-stamping the time of receipt of the offer for trade using said local clock at said trading server which has been characterized using said GPS receiver at said trading server.

267. The Internet-based method of claim 266, which further comprises:

(h) said trading server sending to each said client machine competing in the trading process, a confirmation of the offer for trade receipt containing the time-stamps applied at both the time of transmission and the time of receipt of the offer for trade.

268. The Internet-based method of claim 267, which further comprises:

(i) said trading server matching (i) offers to sell a particular item of property at a particular price with (ii) offers to buy the particular item of property at the particular process, and settling the trade for said particular item of property, and

(j) said trading server sending the client machines involved in said trade settlement, a notice of purchase and sale for the particular item of property.

269. The Internet-based method of claim 260, wherein said item of property is an article of value selected from the group consisting of antiques, financial securities (e.g. stocks and bonds), options, futures, commodities, foreign currency, consumer goods, personal articles and effects, real estate including tracts of land as well as condominiums, licenses to use intangible properties (e.g. bands of the electromagnetic spectrum, patents, etc.), transferable club memberships and subscriptions, and the like.

270. The Internet-based method of claim 260, wherein one or more of said client machines competing in said trading process include intelligent software enabling each said client machine to programmably engage in said trading process with a reduced level of human participation.

271. An Internet-based system for enabling a plurality of traders to compete fairly in a trading process for property to be purchased and sold over the

00514500-002000

Internet in accordance with computer-administrated trading process, said Internet-based system comprising:

a price quotation and trading server (i.e. trading server) having a local clock and a GPS receiver for producing time-stamps referenced to a master clock; and

a plurality of client machines, each said client machine being assigned to one trader competing in the trading process, and each said client machine having a display device for displaying offer to trade information (including an identification of the property, an indication to buy or sell, and a price offer), an input device for inputting offer to trade information, and a GPS receiver for producing time-stamps referenced to said master clock, for application to information including offer to trade input to said client machine.

272. The Internet-based system of claim 271, wherein said computer-administrated trading process comprising the steps of:

(a) said trading server transmitting encrypted offer to trade information to each said client machine, and each said client machine storing said encrypted offer to trade information for substantially simultaneous display on each said client machine at a predetermined globally-referenced start-time.

273. The Internet-based system of claim 272, wherein said computer-administrated trading process further comprises:

(b) ascertaining at each said client machine, the locally-referenced start-time of the trading process expressed in terms of the local clock at said client machine

274. The Internet-based system of claim 273, wherein said computer-administrated trading process further comprises:

(c) at each said client machine, aligning the display time of the encrypted offer to trade information with said locally-referenced start-time.

275. The Internet-based system of claim 274, wherein said computer-administrated trading process further comprises:

(d) at said predetermined globally-referenced start-time, said trading server starts the trading process for the property being offered for trading, by enabling the decryption of said offer to trade information and simultaneous display thereof on each said client machine competing in the trading process.

05514556 . 022800

276. The Internet-based system of claim 275, wherein said computer-administrated trading process further comprises:

(e) said trading server accepting offer to trade from said client machines for the item that are time-stamped after t_1 .

277. The Internet-based system of claim 276, wherein said computer-administrated trading process further comprises:

(f) each said client machine competing in the trading process, sending a offer for trade for an item of property to said trading server and time-stamping the time of transmission of the offer for trade using said local clock at said trading server which has been characterized using said GPS at said trading server.

278. The Internet-based system of claim 277, wherein said computer-administrated trading process further comprises:

(g) said trading server receiving the offer for trade from each said client machine competing in the trading process and sending a offer for trade at step (f) and time-stamping the time of receipt of the offer for trade using said local clock at said trading server which has been characterized using said GPS receiver at said trading server.

279. The Internet-based system of claim 278, wherein said computer-administrated trading process further comprises:

(h) said trading server sending to each said client machine competing in the trading process, a confirmation of the offer for trade receipt containing the time-stamps applied at both the time of transmission and the time of receipt of the offer for trade.

280. The Internet-based system of claim 279, wherein said computer-administrated trading process further comprises:

(i) said trading server matching (i) offers to sell a particular item of property at a particular price with (ii) offers to buy the particular item of property at the particular process, and settling the trade for said particular item of property; and

(j) said trading server sending the client machines involved in said trade settlement, a notice of purchase and sale for the particular item of property.

281. The Internet-based system of claim 271, wherein said item of property is an article of value selected from the group consisting of antiques, financial

09514536-022800

securities (e.g. stocks and bonds), options, futures, commodities, foreign currency, consumer goods, personal articles and effects, real estate including tracts of land as well as condominiums, licenses to use intangible properties (e.g. bands of the electromagnetic spectrum, patents, etc.), transferable club memberships and subscriptions, and the like.

282. The Internet-based system of claim 271, wherein one or more of said client machines competing in said trading process include intelligent software enabling each said client machine to programmably engage in said trading process with a reduced level of human participation.

283. An Internet-based system comprising:

a plurality of GSU-enabled client network devices wirelessly connected to the infrastructure of the Internet, each GSU-enabled client network device being carried on an object to be tracked along the time-space (TS) continuum, and said transmitting digitally-signed data packets containing time-space (TS) coordinate information regarding the TS coordinates of the object carried thereby; and

a TS-stamping based tracking server operably connected to the infrastructure of the Internet, for receiving the digitally-signed data packets from each said GSU-enabled client network device and processing said digitally-signed data packets so as to determine the TS coordinates of the object carried thereby, with respect to a globally referenced timing source and a globally referenced spatial coordinate system.

284. The Internet-based system of claim 283, which further comprises an Internet information for enabling owners and/or custodians of each said object to access the TS coordinate information determined by said TS-stamping base tracking server, for display and use.

285. An Internet-based system for reliably tracking the space-time trajectory of mobile objects using globally time-synchronized clocks, global positioning subsystems, and digital signature techniques carried out with hardware chips embedded within wireless client network devices carried by the objects being tracked.

286. The Internet-based system of claim 285, wherein time-space (TS) coordinate data is stored aboard each said wireless network device as it is generated and then periodically downloaded to a TS-stamping based tracking

009230-86547560

server, eliminating the amount of time that said wireless client network device has to be on-line.

5

287. A wireless GSU-enabled client network device which has one or more biophysiological sensors, to enable remote monitoring of the vital signs of a living object being tracked.

10

288. A GSU-enabled client network device having input sensors and input devices selected from the group consisting of: temperature sensors, humidity sensors, light level sensors, chemical sensors, and other physical property sensors, CCD image capturing devices, sound sensing/pickup and recording devices, fingerprint sensing/detection devices and other biometric sensing devices, vibration sensors, radiation sensors, gas/vapor sensors, speech recognition devices, keypad input devices, graphics input devices, devices for detecting tampering of the GSU-enabled device and/or removal of the GSU from its associated object, and the like.

15

289. An Internet-based system for securing a region of physical space using a GSU-enabled client network device which comprises:

20

a CCD-based digital video camera or scanner for capturing images of a field of view of the camera or scanner,
wherein each captured image frame is accurately space-time stamped, and recorded on videotape or other digital recording medium.

25

290. The Internet-based system of claim 289, wherein said GSU-enabled client network device which further comprises

a sound recording device for recording sound within and about the field of view of the camera.

30

291. A system and method of serving and receiving information over the Internet in connection with time-constrained competitive processes, which avoids the problems of network latency, ensures microsecond "start-time" accuracy, and can determine winners in the competition within microsecond "finish-time" accuracy.

35

292. An Internet-based system for enabling time-constrained competition among a massive number of competitors while compensating for the variable network communication latencies experienced by client machines used by the competitors.

client machine, in order to create the signature for both time-space stamping and to a hash value generated from the data.

5 300. An Internet-based system for fairly and securely enabling timed-constrained competitions over the Internet, wherein the digital signature can be used to prove that the data (i.e. time-space stamp plus a hash of input data) has not been altered, and to prove that it originated from the holder of the secret key (located within the GSU).

10 301. An Internet-based system for fairly and securely enabling timed-constrained competitions over the Internet, wherein each client machine employs a GSU, which combines GPS and digital data signature technology to provide a secure and verifiable time-space stamp on each client machine response.

15 302. An Internet-based system for fairly and securely enabling timed-constrained competitions over the Internet, which is scalable or extensible and capable of simultaneously supporting a multiplicity of competitions, each involving a virtually unlimited number (e.g. millions) of competitors.

20 303. An Internet-based system for fairly and securely enabling timed-constrained competitions over the Internet, which protects against clock device tampering at each client machine by utilizing and comparing multiple clock systems employed in each client machine.

25 304. An Internet-based system for fairly and securely enabling timed-constrained competitions over the Internet, wherein each client machine in the system is provided with a client-based hardware extension to improve clock accuracy and precision and therefore improve client-event response characteristics at each such client machine.

30 305. An Internet-based system for fairly and securely enabling timed-constrained competitions over the Internet, wherein each client machine in the system is provided with a client-based hardware extension to improve security by means of hardware encryption and decryption.

35 306. An Internet-based system for fairly and securely enabling timed-constrained competitions over the Internet, wherein varying degrees of simultaneity can be offered, insuring that the start time on all client machines is

simultaneous within tens of milliseconds at the least precise level, to on the order of within a few microseconds when all of the measures provided for are used.

307. An Internet-based system for fairly and securely enabling timed-constrained competitions over the Internet, wherein one or more a globally-time synchronized Internet-based information servers simultaneously and securely communicate with millions of globally-time synchronized client machines engaged in a predetermined competition supported over the Internet.

308. An Internet-based method for fairly and securely enabling timed-constrained competitions over the Internet, wherein one or more a globally-time synchronized Internet-based information servers simultaneously and securely communicate with millions of globally-time synchronized client machines engaged in a predetermined competition supported over the Internet.

309. An Internet-based system, wherein each client machine is provided with a hardware device which can precisely time and space stamp an event, and thus securely generate an event only when specific time and space criteria are satisfied, and also verify the authenticity of previously generated time and space stamps produced by the hardware device.

310. An method of time-space stamping which can be used to authenticate electronic-commerce transactions between a vendor, bank and customer with microsecond time accuracy.

311. A system and method for electronically filing legal documents, such as patent applications, property transfer documents and court/litigation documents, with governmental or judicial institutions using the http, file transfer protocols (ftp), electronic data interchange (EDI) techniques, and/or any other file transmission protocols supported over the Internet.

312. A global time-synchronization unit for connection to or embedding within any client machine that is to be used in connection with the Internet-supported system and method of the present invention.

313. A global time-synchronization unit for connection to or embedding within any Internet information server that is to be used in connection with the Internet-supported system and method of the present invention.

3.14. A system and method of receiving information from securities (e.g. stocks and bonds), commodities and/or foreign currency information servers, representing real-time or "live" market conditions, and simultaneously disseminating such information to globally-synchronized client machines located world-wide to enable secure "on-line" electronic-based securities trading operations, commodities trading operations, and foreign currency trading operations in a fundamentally fair manner.

315. A system and method for electronic-based on-line securities trading, commodities trading, and foreign currency trading in a secure and fundamentally fair manner using client machines globally-synchronized with corresponding Internet-based securities trading servers, commodities trading servers, and foreign currency trading servers, respectively, so that each market competitor is informed about incremental changes in market conditions at substantially the same time and therefore is permitted to respond to such market condition changes (e.g. changes in stock, commodity or currency prices) at substantially the same time in accordance with principles of fundamental fairness and fair play.

316. An improved system and method of simultaneously disseminating securities, commodities, and/or foreign currency information (e.g. real-time price quotes) using globally time-synchronized information servers and client machines.

317. An Internet-based system and method which enables competitors to trade securities, commodities and/or foreign currencies using real-time pricing information that is disseminated to all competitors of a given level of service at substantially the same instant in time using a network of globally time-synchronized information servers and client machines.

318. An Internet-based information network, wherein competition supporting information servers (e.g. market price advertising servers and order execution servers) are time-synchronized with a plurality of globally-distributed time-synchronized client machines that can be preprogrammed so respond to real-time securities prices within micro-second client event accuracy by transmitting time and space stamped orders to purchase and/or sell securities, commodities and/or foreign currencies.

0514590.000000

319. An Internet-based information network comprising server and client computer systems, wherebetween competition-promoting/supporting processes (e.g. bidding processes) are carried out among individuals over the Internet, and accurate time-stamping operations are performed at both the client and server ends of the network so that the response (i.e. bid) of each individual can be reliably accepted based upon its submission-time at the client computer system, and not upon the receipt-time thereof at the server computer system.

320. An Internet-based method of supporting competitive processes over the Internet using a network of server and client computer systems, wherebetween competition-promoting/supporting processes (e.g. bidding processes) are carried out among individuals over the Internet, wherein accurate time-stamping is performed at both the client and server ends of the competition-supporting process, so that the response (i.e. bid) can be reliably accepted based upon its submission-time at the client computer system, and not upon the receipt-time thereof at the server computer system.

321. An Internet-based system for enabling the embedding of a message within a transportable GSU-enabled computing device so that the message can only be decrypted in a specific location at a specific time period.

322. An Internet-based system comprising:

a plurality of GSU-enabled client network devices wirelessly connected to the infrastructure of the Internet, each GSU-enabled client network device being carried on an object to be tracked along the time-space (TS) continuum, and said transmitting digitally-signed data packets containing time-space (TS) coordinate information regarding the TS coordinates of the object carried thereby; and

a TS-stamping based tracking server operably connected to the infrastructure of the Internet, for receiving the digitally-signed data packets from each said GSU-enabled client network device and processing said digitally-signed data packets so as to determine the TS coordinates of the object carried thereby, with respect to a globally referenced timing source and a globally referenced spatial coordinate system.

323. The Internet-based system of claim 322, which further comprises an Internet information for enabling owners and/or custodians of each said object to access the TS coordinate information determined by said TS-stamping base tracking server, for display and use.

05511590 022000

- 5 324. An Internet-based system for reliably tracking the space-time trajectory of mobile objects using globally time-synchronized clocks, global positioning subsystems, and digital signature techniques carried out with hardware chips embedded within wireless client network devices carried by the objects being tracked.
- 10 325. The Internet-based system of claim 324, wherein time-space (TS) coordinate data is stored aboard each said wireless network device as it is generated and then periodically downloaded to a TS-stamping based tracking server, eliminating the amount of time that said wireless client network device has to be on-line.
- 15 326. A wireless GSU-enabled client network device which has one or more biophysiological sensors, to enable remote monitoring of the vital signs of a living object being tracked.
- 20 327. A GSU-enabled client network device having input sensors and input devices selected from the group consisting of: temperature sensors, humidity sensors, light level sensors, chemical sensors, and other physical property sensors, CCD image capturing devices, sound sensing/pickup and recording devices, fingerprint sensing/detection devices and other biometric sensing devices, vibration sensors, radiation sensors, gas/vapor sensors, speech recognition devices, keypad input devices, graphics input devices, devices for detecting tampering of the GSU-enabled device and/or removal of the GSU from its associated object, and the like.
- 25 328. An Internet-based system for securing a region of physical space using a GSU-enabled client network device which comprises:
- 30 a CCD-based digital video camera or scanner for capturing images of a field of view of the camera or scanner,
- wherein each captured image frame is accurately space-time stamped, and recorded on videotape or other digital recording medium.
- 35 329. The Internet-based system of claim 328, wherein said GSU-enabled client network device which further comprises
- a sound recording device for recording sound within and about the field of view of the camera.

05514590-0222800

5

330. A system and method of serving and receiving information over the Internet in connection with time-constrained competitive processes, which avoids the problems of network latency, ensures microsecond "start-time" accuracy, and can determine winners in the competition within microsecond "finish-time" accuracy.

10

331. An Internet-based method of securing a computers communications network supporting a network computing device, said Internet-based method comprising the steps of:

(a) embodying a GSU chip into said network computing device so provide a GSU-enabled network computing device,

15

(b) programming the GSU chip in said GSU-enabled network computing device with a set of predetermined time and space (TS) coordinates so as to enable said GSU-enabled network computing device to access said communications network of subnetwork thereof (or WWW server connected thereto) only when said GSU-enabled network computing device is temporally and spatially present at said TS coordinates; and

20

(c) disposing said GSU-enabled network computing device at said predetermined TS coordinates so as to automatically enable said GSU-enabled network computing device to access said communications network of subnetwork thereof (or WWW server connected thereto).

25

332. The Internet-based method of claim 330, wherein step (c) comprises said GSU transmitting a digitally-signed data package to a TS-stamping tracking server for receiving said digitally-signed data package and processing the same collect data indicative that said GSU-enabled network computing device is present at said predetermined TS coordinates and automatically transmitting a digitally-signed data package back to said GSU-enabled network computing device enabling said GSU-enabled network computing device to access said communications network of subnetwork thereof (or WWW server connected thereto).

30

35

333. An Internet-based method of securing a computers communications network supporting a network computing device, said Internet-based method comprising the steps of:

(a) embodying a GSU chip into said network computing device so provide a GSU-enabled network computing device, and

(b) programming the GSU chip in said GSU-enabled network computing device with a set of predetermined time and space (TS) coordinates so as to fully

00514598-022600

enable said GSU-enabled network computing device to access said communications network of subnetwork thereof (or WWW server connected thereto) when said GSU-enabled network computing device is temporally and spatially present at said TS coordinates, and partially enable said GSU-enabled network computing device to partially access said communications network of subnetwork thereof (or WWW server connected thereto) when said GSU-enabled network computing device is not temporally and spatially present at said TS coordinates; and

(c) disposing said GSU-enabled network computing device outside of said predetermined TS coordinates so as to partially enable said GSU-enabled network computing device to partially access said communications network of subnetwork thereof (or WWW server connected thereto) so that a TS-stamping tracking server can track to the exact location of said GSU-enabled network computing device and authorities apprehend the person using the same without authorization.

333. An Internet-based system for enabling the embedding of a message within a transportable GSU-enabled computing device so that the message can only be decrypted in a specific location at a specific time period.

334. An Internet-based system for enabling the reception of secure radio communications by using a GSU-enabled client computing device of the present invention equipped, with radio communications capabilities, which is enabled by a TS-stamping based tracking receiver to only decrypt an particular incoming radio message or messages at a particular location at a particular period of time, and at no other space-time instant.

335. An Internet-based system for displaying information clues or instructions at particular instances along the space-time continuum, wherein a wireless GSU-enabled client network device (realized for example in the form of a watch or other portable casing having an integrated display screen and keypad) cooperates with a TS-stamping based tracking server through a global communication network so as to enable the GSU-enabled client network device to display information clues and/or instructions only when the GSU-enabled device is present within specific location over a particular time interval (i.e. intersects a prespecified region along the space-time continuum).

336. An Internet-based system for collecting space-time coordinates of an athlete or animal at particular instances along the space-time continuum,

000220-06547560

wherein a wireless GSU-enabled client network device affixed (i.e. strapped) to the body of a human athlete (e.g. skier, runner or swimmer) or animal participating in sports competition, cooperates with a TS-stamping based tracking server through a global communication network so as to enable the GSU-enabled client network device to collect TS coordinate data during the competition, TD data is collected from the GSU-enabled device carried by the athlete on a real-time basis as the athlete or animal travels from point to point, along a predetermined course, and where collected TS data can be remotely analyzed to determine the performance of the athlete in the competition and determination of a winner.

337. An Internet-based method of and system for enabling the operation of set-top cable television boxes, and other digital media content delivery devices, in compliance with license agreements, wherein a GSU-enabled network computing device is embedded within each set-top cable television box, and other digital media content delivery device, in a media content delivery system, and one or more TS-stamping based tracking servers are used to track and control such media content delivery devices so that the media content delivery devices are enabled into operation only when such devices are in fact used in accordance with the conditions of use set forth in the license agreement with the customer (i.e. when used within the particular location specified in the license agreement and during the time duration thereof).

338. An Internet-based method of and system for enabling/controlling the operation any portable host system or device which is restricted to operate within a set of space-time constraints, by embedding a GSU-enabled device within each such portable host system or device, and using one or more TS-stamping based tracking servers to track and enable the operation of each such portable host system or device only when such systems and devices are in fact used in accordance with the conditions of use set forth in the license agreement.

339. An Internet-based method of and system for enabling/controlling the operation any portable host system, by embedding a GSU-enabled device within each such portable host system or device, and using one or more TS-stamping based tracking servers to track and enable or otherwise control particular functions within the host system based on its time-space coordinates.

340. An Internet-based system for securing a region of physical space, comprising:

a GSU-enabled client network device having a CCD-based digital video camera or scanner for capturing images of a field of view (FOV) of the camera or scanner, and/or a sound recording device for recording sound (tracks) within and about the field of view (FOV) of the camera.

wherein each captured image frame is accurately space-time stamped, and recorded on videotape or other digital recording medium associated with a RDBMS.

341. The Internet-based system of claim 340, which further comprises a Web-based owner/device registration server for registering owners (or custodians) of GSU-enabled devices.

342. The Internet-based system of claim 340, which further comprises a Web-based image monitoring server for allowing owners to view image/sound frames captured and stored in said RDBMS.

343. The Internet-based system of claim 340, which further comprises a Web-enabled client machines for carrying out such owner involved operations.

344. An Internet-based method of securing a computer communications network having a plurality of network computing devices, said method comprising the steps of:

(a) embodying a GSU device into each network computing device so that its access to a particular communications/computer network (i.e. subnetwork) or WWW site can be securely enabled by a TS-stamping tracking server only upon the generation of a unique time-space stamp by the GSU-chip corresponding to a predetermined location over which the GSU-enabled network computing device is enabled; and

(b) disposing said GSU-enabled network computing device at said predetermined location so that said GSU-enabled network computing device is enabled by said TS-Stamping Based Tracking Server to access a prespecified communication subnetwork or WW server.

345. An Internet-based method for securing a computers communications network by embodying a GSU chip, wherein a GSU-enabled network computing device which is used to access a particular communications (sub)network or WWW site, is partially enabled by the enabled the TS-stamping tracking server when the GSU-enabled network computing device is present outside of the predetermined location, or predetermined time interval, so that the TS-stamping

tracking server can track to the exact location of the GSU-enabled computing device and authorities apprehend the personal using the same without authorization.

5 346. An Internet-based system for tracking an object, said Internet-based system comprising:

a GSU carried on said object, for automatically generating TS coordinate data indicative of the TS coordinates of said object with reference to a global reference system; and

10 a TS-stamping tracking server, for communication with said GSU, and collecting the TS coordinates of said object as said object moves through the TS continuum, and storing said TS coordinates in memory for analysis and/or monitoring operations.

15 347. The Internet-based system of claim 346, wherein said object is a living being or animal, and said GSU further comprises a biometric sensor for sensing a vital signal of said living being on which said GSU is being carried, and providing biometric data to said TS-stamping tracking server for collection and storage, and analysis and/or monitoring operations.

20 348. The Internet-based system of claim 346, which further comprises a Web-based owner/object registration server for registering owners (or custodians) of said object.

25 349. The Internet-based system of claim 346, which further comprises a Web-based object trajectory monitoring server for allowing owners to monitor the TS trajectory of said object during tracking operations.

30 350. The Internet-based system of claim 346, which further comprises a Web-enabled client machines for carrying out such owner involved operations.

35 351. An Internet-based system for displaying information at particular instances along the space-time (TS) continuum, comprising:
a GSU-enabled client network device having a GSU, a display, and a wireless connection to the infrastructure to the Internet; and
a TS-stamping based tracking server operably connected to the infrastructure of the Internet, and communicating with said GSU so as to enable said GSU-enabled client network device to present said information to said

display only when said GSU-enabled client network device intersects a prespecified region along the space-time (TS) continuum.

352. The Internet-based system of claim 351, wherein said information is a encrypted radio message received by said GSU-enabled client network device

353. The Internet-based system of claim 351, wherein said GSU-enabled client network device is realized in the form of a watch or other portable casing having an integrated display screen and keypad.

354. The Internet-based system of claim 351, which further comprises a Web-based owner/device registration server for registering owners (or custodians) of said device.

355. The Internet-based system of claim 351, which further comprises a Web-based display monitoring server for allowing owners to monitor the display of said device.

356. The Internet-based system of claim 351, which further comprises a Web-enabled client machines for carrying out such owner involved operations.

357. An Internet-based system for displaying information at particular instances along the space-time (TS) continuum, comprising:
a GSU-enabled client network device having a GSU and a display; and
a TS-stamping based tracking server communicating with said GSU so as to enable said GSU-enabled client network device to present said information to said display only when said GSU-enabled client network device intersects a prespecified region along the space-time (TS) continuum.

358. The Internet-based system of claim 357, wherein said information is a encrypted radio message received by said GSU-enabled client network device.

359. The Internet-based system of claim 357, wherein said display is an audio display device.

360. The Internet-based system of claim 357, wherein said GSU-enabled client network device is realized in the form of a watch or other portable casing having an integrated display and keypad.

000220 06547560

361. The Internet-based system of claim 357, which further comprises a Web-based owner/device registration server for registering owners (or custodians) of said device.
362. The Internet-based system of claim 357, which further comprises a Web-based display monitoring server for allowing owners to monitor the display of said device.
363. The Internet-based system of claim 357, which further comprises a Web-enabled client machines for carrying out such owner involved operations.
364. An Internet-based system for displaying information clues or instructions at particular instances along the space-time (TS) continuum, comprising:
a GSU-enabled client network device having a GSU, a display, and a wireless connection to the infrastructure to the Internet; and
a TS-stamping based tracking server operably connected to the infrastructure of the Internet, and communicating with said GSU so as to enable said GSU-enabled client network device to present said information clues and/or instructions to said display only when said GSU-enabled client network device intersects a prespecified region along the space-time (TS) continuum.
365. The Internet-based system of claim 364, wherein said GSU-enabled client network device is realized in the form of a watch or other portable casing having an integrated display screen and keypad.
366. The Internet-based system of claim 364, which further comprises a Web-based owner/device registration server for registering owners (or custodians) of said device.
367. The Internet-based system of claim 364, which further comprises a Web-based display monitoring server for allowing owners to monitor the display of said device.
368. The Internet-based system of claim 364, which further comprises a Web-enabled client machines for carrying out such owner involved operations.
369. An Internet-based system for enabling the operation of a transportable digital media content delivery device, in a media content delivery system, comprising:

a GSU device embedded within said transportable digital media content delivery device, for automatically generating TS coordinate data indicative of the TS coordinates of said transportable digital media content delivery device, with reference to a global reference system; and

a TS-stamping tracking server, for communication with said GSU, and collecting the TS coordinates of said object as said object moves through the TS continuum, and enabling the operation of said transportable media content delivery device only when said transportable digital media content delivery device is present within the particular region of said time-space (TS) continuum.

~~370. The Internet-based system of claim 369, wherein said transportable digital media content delivery device is a set-top television box.~~

371. The Internet-based system of claim 369, which further comprises a Web-based owner/device registration server for registering owners (and/or licensed users) of said transportable digital media content delivery device.

~~372. The Internet-based system of claim 369, which further comprises a Web-based device monitoring server for allowing owners to monitor the TS trajectory of said transportable digital media content delivery device.~~

373. The Internet-based system of claim 369, which further comprises a Web-enabled client machines for carrying out such owner involved operations.